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| APPLICATION NO.                                                                                                                   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.               | CONFIRMATION NO. |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------|-----------------------------------|------------------|
| 10/735,926                                                                                                                        | 12/16/2003  | Masatoshi Shiraishi  | OMY-0034                          | 4251             |
| 23353 7590 04/19/2007<br>RADER FISHMAN & GRAUER PLLC<br>LION BUILDING<br>1233 20TH STREET N.W., SUITE 501<br>WASHINGTON, DC 20036 |             |                      | EXAMINER<br>CHACKO DAVIS, DABORAH |                  |
|                                                                                                                                   |             |                      | ART UNIT                          | PAPER NUMBER     |
|                                                                                                                                   |             |                      | 1756                              |                  |
| SHORTENED STATUTORY PERIOD OF RESPONSE                                                                                            |             | MAIL DATE            | DELIVERY MODE                     |                  |
| 3 MONTHS                                                                                                                          |             | 04/19/2007           | PAPER                             |                  |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/735,926

Applicant(s)

SHIRAISHI ET AL.

Examiner

Daborah Chacko-Davis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on January 26, 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 1-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 22-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 12/03, 03/07.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Election/Restrictions***

1. Applicant's election without traverse of Group Iv, claims 22-25, in the reply filed on January 26, 2007, is acknowledged. Claims 1-21, are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

***Claim Rejections - 35 USC § 112***

2. Claim 25 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 25, at lines 10-11, recites "a driving portion for driving at least the second nozzle of the first nozzle and the second nozzle along with the surface of the substrate". It is not clear how the second nozzle is part of the first nozzle. Also, it is not clear how "the second nozzle of the first nozzle" and "the second nozzle" relate or differ to each other. The first nozzle, as recited in lines 3-5 of claim 25, has a first resist coating material, and the second nozzle, as recited in lines 6-9, of claim 25, has a second resist coating material. The specification, on pages 82-83, recites that the first nozzle (reference 212a) and the second nozzle (reference 212b) are part of a nozzle (reference 212). Appropriate correction is required.

3. Claim 25, at lines 10-11, recites the limitation "the second nozzle of the first nozzle". There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claim 22 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over U. S. Patent No. 5,626,913 (Tomoeda et al., hereinafter referred to as Tomoeda).

Tomoeda, in col 5, lines 65-67, in col 6, lines 1-8, and lines 28-62, in col 7, lines 1-8, in col 8, lines 47-67, discloses a wafer processing system (substrate processing apparatus) that includes resist coating units (resist film forming means) that coat a resist on the surface of a wafer (form a resist film), and a controller (mass-flow controller and a flowmeter) that controls the supply amount (distribution of a dissolving characteristic of the resist) of the developing solution introduced onto the surface of the resist film on the wafer so as to develop the resist film avoiding development non-uniformity (i.e., developing the resist in a direction of a thickness of the resist film) (claim 22).

Tomoeda teaches a developing unit that is controlled by a mass-flow controller and a flowmeter. In the event any differences can be shown for the developing unit that controls the developing solution in a direction of a thickness of the resist film, as opposed to the mass-flow controlled developing unit taught by Tomoeda, such differences would have been obvious to one of ordinary skill in the art because Tomoeda, in col 7, lines 1-8, in col 8, lines 13-15, lines 16-31, in col 9, lines 1-13,

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teaches that the developing solution supply is controlled in a manner that the i) developing solution supply is gradually increased thereby gradually increasing the concentration of the developing solution, ii) the developing solution supplied spreads more smoothly on the resist film, and iii) that the development process is so performed to avoid any development non-uniformity caused by the resist residual (scum of the resist) dissolved in the developing solution realizing uniform development i.e., the development of the resist is in the direction of the thickness of the resist film.

6. Claim 23, is rejected under 35 U.S.C. 102(b) as being anticipated by U. S. Patent Application Publication No. 2002/0076658 (Matsushita et al., hereinafter referred to as Matsushita).

Matsushita, in [0012], [0013], [0014], [0017], discloses a coating and developing apparatus (substrate processing apparatus) that is capable of transferring a substrate that has a first surface and a second surface opposite to the first surface (see wafer W, in figure 12), to an exposing processing unit (half-exposing a resist i.e., prior to the peripheral exposure performed in the peripheral exposure apparatus, reference 65 of figure 7). Matsushita, in [0036], [0037], [0038], and [0039], discloses that the coating and developing apparatus includes a coating unit that coats the wafer W with a resist solution to form a resist-coating film on the wafer surface (first surface). Matsushita, in [0042], and [0049], discloses that the wafer (resist coated wafer) is set on a heating plate (temperature adjusting plate) that heats the wafer from the second surface side. Matsushita, in [0082], discloses that the temperature adjusted air (heating portion) is flown down into the temperature adjusting unit i.e., heating provided at the first surface

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of the resist-coated wafer, and that the temperature adjusted wafer is transferred to an interface section (S2 of figures 3, and 4)) prior to transferring to the exposing apparatus (reference 200 of figure 3) (claim 23).

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 24, is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent Application Publication No. 2002/0076658 (Matsushita et al., hereinafter referred to as Matsushita) in view of U. S. Patent Application Publication No. 2002/0123011 (Kawano et al., hereinafter referred to as Kawano).

Matsushita is discussed in paragraph no. 6.

Matsushita, in [0049], teaches that the heating from the second surface side at a second temperature is provided by a heating plate (second heating plate) on which the wafer is set. Matsushita, in [0082], discloses that air at a different temperature (first temperature, temperature adjusted air) is flown into the first surface side of the wafer i.e., heating provided at the first surface (claim 24).

The difference between the claims and Matsushita is that Matsushita does not disclose that the temperature-adjusted air provided at the first surface is heated by a first heating plate.

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Kawano, in [0151], [0152], [0153], [0154], [0156], and in figure 11, discloses providing a first heating plate (proximity plate, reference 1107 of figure 11) that has a first temperature at the first surface side of the resist coated wafer to heat the resist film and a second heating plate that has a second temperature at the second surface of the resist coated wafer.

Therefore, it would be obvious to a skilled artisan to modify Matsushita by employing the proximity plate as the first heating plate to heat the first surface side of the wafer as suggested by Kawano because Kawano, in [0156], [0157], [0158], discloses that using proximity plate as the heating plate (first heating plate) prevent condensation of the evaporated substances from the resist film formed, and thus avoids falling droplets from dissolving the solid resist film on the wafer further preventing degradation of the film thickness distribution.

9. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,371,667 (Kitano et al., hereinafter referred to as Kitano) in view of U. S. Patent No. 6,300,043 (Konishi et al., hereinafter referred to as Konishi).

Kitano, in col 1, lines 43-47, in col 3, lines 60-67, in col 5, lines 11-18, and lines 53-67, in col 6, lines 1-12, discloses a coating and developing apparatus (substrate processing apparatus) that includes a holder for holding the wafer (substrate holder, see figure 4, W is positioned on a holder), a first nozzle N1 (or N11) that coats the substrate with a first resist, and a second nozzle N2 (or N12) that contains a second material different from the first resist material to coat the substrate with a second resist. Kitano, in col 10, lines 61-67, and in col 11, lines 1-12, discloses that the first resist

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discharge nozzle and the second resist discharge nozzle are moveable in radial direction of the wafer (along the surface of the substrate) by a common drive system (reference 111 of figure 28).

The difference between the claims and Kitano is that Kitano does not disclose that the second resist solution that forms the second resist film is coated onto the first resist film formed on the wafer, and that the second resist film exposure reacts with a second exposure energy smaller than the first exposure energy required (for reacting) of the first resist.

Konishi, in col 4, lines 48-67, in col 5, lines 53-67, in col 6, lines 28-41, discloses discharging a first resist solution via a nozzle (reference 73) to form a resist film on the substrate, discharging a second coating (acidic film) via a different nozzle for coating a second film on the resist film, wherein the second film is a TARC acidic film and TARC film inherently has a second exposure energy (TARC films have a low index and low absorption requirement) that is less than the exposure energy required by the first resist film.

Therefore, it would be obvious to a skilled artisan to modify Kitano by using second nozzle to discharge the second film material onto the first resist material film as suggested by Konishi because Konishi, in col 2, lines 35-44, discloses that the acid component solution formed on the first resist film has a low dissolving power and thus protects the underlying resist layer from dissolving and Konishi, in col 6, lines 28-41, discloses that the acidic solution forms a TARC coating on the resist film and prevents surface reflections of the light used for light exposure, and Kitano, in col 5, lines 53-67,



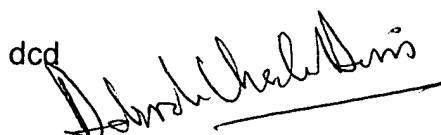
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and in col 6, lines 1-11, discloses that the resist solutions from the resist solution tanks that are discharged from the corresponding discharge nozzles are independent of one another and that the viscosity of the resist solutions are different from one another, i.e., each resist solution has a different exposure energy requirement.

***Conclusion***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd



April 16, 2007.